

New Species and Combinations in *Ceradenia* (Grammitidaceae)

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ABSTRACT. *Ceradenia asthenophylla*, *C. aulaeifolia*, and *C. tristis* are described from Mesoamerica, and their relationships are discussed. Fifteen species of *Ceradenia* are now known from the region; all are characterized by peculiar whitish glandular paraphyses and lack of hydathodes. Three new combinations are also made in the genus for Andean species: *Ceradenia bishopii*, *Ceradenia intricata*, and *C. semiadnata*.

So that names will be available for the pteridophyte volume of *Flora Mesoamericana*, three new species of *Ceradenia* are herein described. These were recognized as new on specimens annotated by L. E. Bishop, who began a revision of the genus (Bishop, 1988, 1989) but was unable to complete it. In addition to the new species, three new combinations are made for species occurring in South America. These were also contained in an unpublished manuscript by Bishop.

Ceradenia asthenophylla L. E. Bishop ex A. R. Smith, sp. nov. TYPE: Colombia. Huila: Cordillera Central, E slope between Páramo de las Papas and San Antonio, 2,900 m, *Bishop 1984* (holotype, UC). Figure 1I–L.

Ceradeniae knightii affinis, a qua imprimis differt stipitibus sparsim setosis (non dense setosis), laminis 6–10-plo longioribus quam latoribus (non 4–6-plo longioribus quam latoribus), laminis tenuis (non incrassitis) et trichomatibus numerosis ramosis glandulosis praeditis.

Plants epiphytic; rhizome slender, with atropurpureous scales 2–4 × 0.3–0.4 mm, with concolorous setulae or glandular hairs; petiole brown, 2–4 cm × 0.2–0.4 mm, with a few scattered castaneous setae to 3 mm distally and much more numerous simple or branched hairs throughout its length, 0.25–0.35 times the length of the lamina, not flexed distally; rachis abaxially with sclerenchyma exposed, with scattered setae 1.5–3 mm; lamina linear, narrowed at base with 2–4 reduced pinna pairs, apex not seen, deeply pinnatifid, up to 15 cm long; pinnae to 0.8 cm × 4 mm, entire or faintly subrepand, set 70–80° to rachis, at base dilated on both sides or straight acroscopically, apex broadly rounded, with castaneous setae along margins and

costae abaxially, a few scattered setae and numerous, branched, glandular hairs on lamina, costal sclerenchyma exposed; texture thin-herbaceous; sori inframedial to medial, up to 4 pairs per pinna, superficial, lacking setae but sporangia intermixed with numerous, stalked, gland-tipped paraphyses.

This species is named for its thin, rather lax leaves (from Greek *asthenes*, weak). It is most closely related to *C. knightii* (Copeland) L. E. Bishop, which has densely setose petioles, lamina only 4–6 times longer than broad, and thick-herbaceous to chartaceous lamina lacking numerous, branched, glandular hairs abaxially. *Ceradenia knightii* is known from Costa Rica, Colombia, and Hispaniola.

Paratype. COSTA RICA. **Cartago:** Cerro de la Muerte, 1 km NW of Villa Mills on Interamerican Hwy., behind Hotel La Georgina, 2,900 m, *Mickel 3206* (NY).

Ceradenia aulaeifolia L. E. Bishop ex A. R. Smith, sp. nov. TYPE: Costa Rica. Limón: Cordillera de Talamanca, SW base of Cerro Ká-muk, in shrub-tree páramo, 3,200–3,350 m, *Davidse, Herrera & Warner 25939* (holotype, UC; isotype, MO). Figure 1A–H.

Inter species subgeneris *Filicipectinis* frondibus pendentibus indeterminatibus et laminis perpinnatis ad *C. maioris* et species affines accedens sed costarum abaxialium sclerenchymate manifeste exposito, frondibus majoribus, pinnis margine valde sinuatis, laminis chartaceis ab eis recedens.

Plants epiphytic or lithophytic; rhizome stout, with castaneous scales 5–10 × 0.3–0.7 mm, with hyaline to concolorous setulae or white glands at the margin; petiole atropurpureous, 10–40 cm × 0.6–1.2 mm, at the base with a few to many castaneous setae to 3 mm usually intermixed with much more numerous short setulae 0.2–0.3 mm, sometimes glabrate distally, about equaling the lamina length, not flexed distally; rachis atropurpureous to blackish, abaxially with scattered hairs and occasionally a few setae, adaxially densely setose; lamina pendulous, lanceolate, usually narrowed at base with 1–4 pairs of reduced pinnae, lacking a distinct apical segment but with prolonged (indeterminate?) apical growth, perpinnate throughout, up to 50 cm (or more?) long;

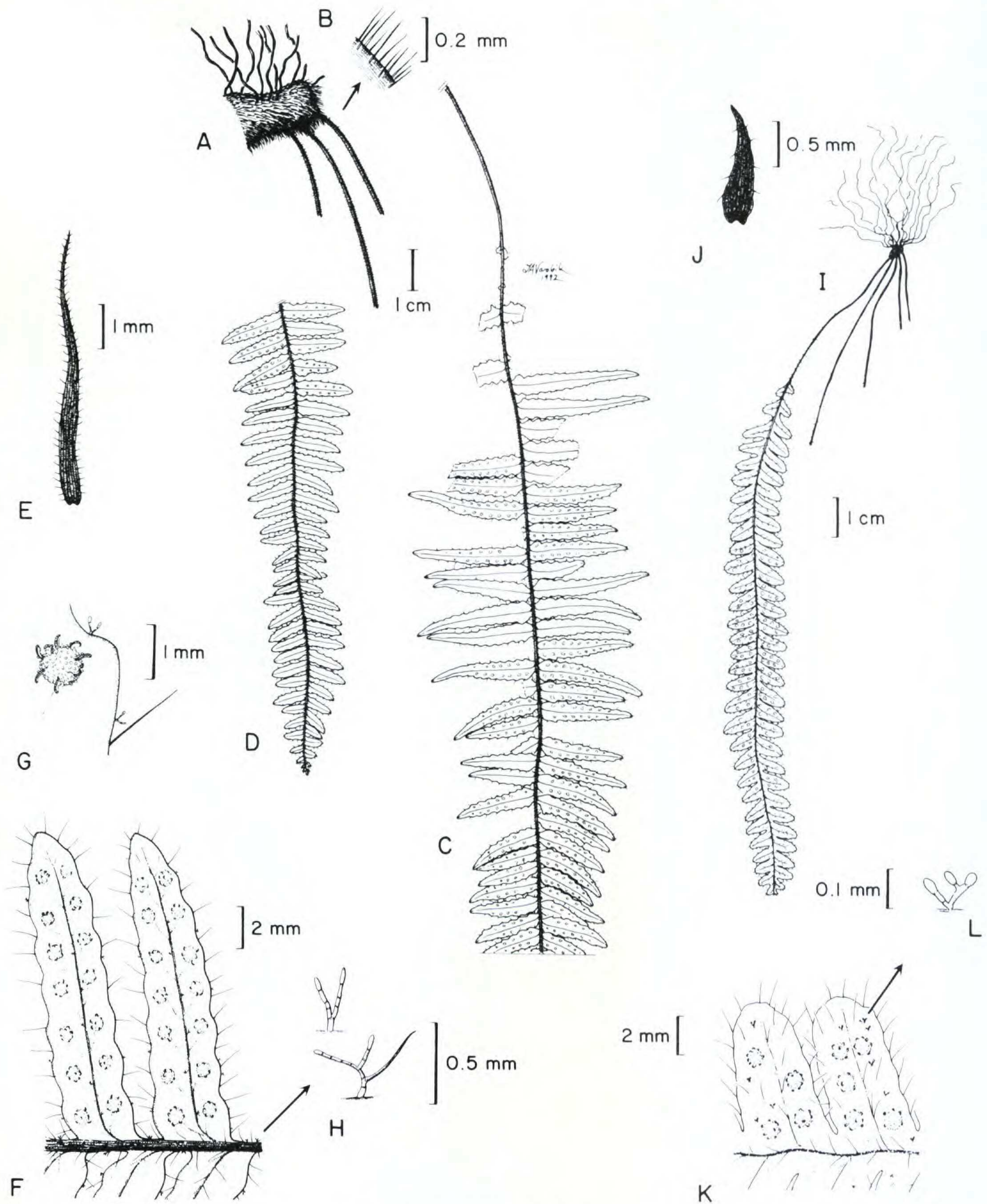


Figure 1. New species of *Ceradenia*. A–H. *C. aulaeifolia* L. E. Bishop ex A. R. Smith, *Davidse 25939* (UC). — A. Rhizome and petiole bases. — B. Setulae at base of petiole. — C. Proximal portion of leaf. — D. Distal portion of leaf. — E. Rhizome scale. — F. Pinnae. — G. Sorus with glands. — H. Trichomes on abaxial rachis. I–K. *C. asthenophylla* L. E. Bishop ex A. R. Smith, *Bishop 1984* (UC). — I. Habit. — J. Rhizome scale. — K. Pinnae. — L. Trichomes on abaxial surface of lamina.

pinnae to 4 cm × 6 mm, strongly sinuate, set 80–90° to rachis, at base usually constricted on both sides, especially acroscopically, apex acuminate to obtuse, with castaneous setae 0.5–1.5 mm and

shorter branched hairs along margins, costae with prominently exposed sclerenchyma and simple or branched hairs abaxially, lacking setae, adaxially the costae slightly exposed, with branched hairs and

scattered setae; texture chartaceous; sori medial, up to 12 pairs per pinna, superficial, lacking setae but sporangia intermixed with numerous, stalked, gland-tipped paraphyses.

This striking species is named for the long, pendulous leaves that hang from the trees in high-elevation cloud forests (Latin *aulaeum*, curtain or tapestry). It is closely related to the Colombian *C. mayoris* (Rosenstock) L. E. Bishop, under which Lellinger (1989) treated it, and *C. semiadnata* (Hooker) L. E. Bishop, from Colombia and Ecuador. *Ceradenia aulaeifolia* agrees with these and with *C. intricata* (C. V. Morton) A. R. Smith, *C. congesta* (Copeland) A. R. Smith, and *C. arthrothrix* L. E. Bishop & A. R. Smith in having pendulous fronds, indeterminate leaf apex, and peripinnate laminae with pinnae not connected along the rachis. From all of these it is distinguished by the exposed costal sclerenchyma on both sides of the pinnae, especially abaxially. From *C. mayoris* it also differs in its larger size, more strongly sinuate pinna margins, and thinner laminae. *Ceradenia semiadnata*, which occasionally has the costal sclerenchyma exposed, differs from *C. aulaeifolia* in the presence of setae on the lamina surface and the relatively broader pinnae.

An obvious feature of most specimens of this species is the crowded, short setulae 0.2–0.3 mm on the petioles. This characteristic is shared with *C. mayoris*. In this latter species these setulae are at times lost with age. In *C. aulaeifolia* a few specimens lack them entirely, so that their absence does not appear to be age related.

Paratypes. COSTA RICA. **Cartago:** S slope Volcán de Turrialba, near Finca del V. Turrialba, 2,000–2,400 m, *Standley 35051* (US). **Limón:** Cerro Chirripó, 10,400–11,000 ft., *Evans & Lellinger 168* (US); Cordillera de Talamanca, Cerro Kámuk peak, *Davidse et al. 26048* (MO, UC); Cordillera de Talamanca, SW foot of Cerro Kámuk, 3,200 m, *Davidse et al. 25966* (MO). **San José:** Cerro Chirripó, SW slopes between Canaan and summit, 8,500–10,000 ft., *Evans & Lellinger 81* (US); Cerro de las Vueltas, 2,700–3,000 m, *Standley & Valerio 43743, 43824* (US). PANAMA. **Bocas del Toro:** Cordillera de Talamanca, 4 km NW of Cerro Fábrega peak, 3,000–3,150 m, *Davidse et al. 25414* (MO); between Itamut and Bine peaks, Fábrega massif, 3,200 m, *Gómez et al. 22534* (MO, UC).

Ceradenia tristis A. R. Smith, sp. nov. TYPE: Costa Rica. San José: Pan American Hwy., Km 72–73, or 21–22 km SE of El Empalme, between Cartago and San Isidro del General, 2,800 m, *Smith & Béliz 2077* (holotype, UC; isotype, CR).

Differt a *C. spixiana* paleis rhizomatis castaneis (non aureobrunneis), pinnis basi acroscopica constrictis (non

dilatatis utrinque), et apicibus pinnarum attenuatis (non rotundatis vel acutis). Differt a *C. kookenamae* et *C. kalbreyeri* pinnis setosis margine.

Plants epiphytic; rhizome stout, with castaneous scales to 10×0.5 mm, these with hyaline or pale setulae; petiole atropurpureous, up to $34 \text{ cm} \times 1.4$ mm, with scattered castaneous setae to 3 mm proximally and a few distally, intermixed with simple or branched hairs throughout, ca. 1.5 times lamina length; rachis abaxially with sclerenchyma dark brown, with scattered simple or branched hairs 0.3–0.8 mm, lacking setae or only a few setae toward base; lamina lanceolate, usually broadest just above base (lowermost 1–2 pairs of pinnae slightly reduced), apex not seen, deeply pinnatifid to pinnatisect, at the very base peripinnate, to 22 cm long; pinnae to $5 \text{ cm} \times 5$ mm, entire or faintly repand, set $80\text{--}90^\circ$ to rachis, at base usually constricted acroscopically and decurrent basiscopically, apex acuminate, with castaneous setae along margins, scattered simple or branched hairs along abaxial costae; texture thick-chartaceous; sori supramedial, up to 16 pairs per pinna, superficial, lacking setae, sporangia intermixed with numerous, stalked, gland-tipped paraphyses.

The species epithet recalls the sadness felt over Dr. Bishop's tragic illness and death, just as he was entering a most productive period in his research on *Ceradenia* and other genera of Grammitidaceae.

Valerio 68 (US), from Volcán Barba, is close to this species but differs in several characters. The petiolar setae are lacking toward the base, the pinnae are nearly linear-oblong and closely spaced, and the costae lack setae adaxially.

Of Central American ceradenias, *Ceradenia tristis* is most similar to *C. spixiana* (C. Martius ex Mettenius) L. E. Bishop, which differs by the golden brown rhizome scales and more parallel-sided pinnae that are dilate on both sides at their base and more rounded at the apex. Other close relatives in Central America are *C. kookenamae* (Jenman) L. E. Bishop and *C. kalbreyeri* (Baker) L. E. Bishop, which lack setae on the pinna margins. *Ceradenia meridensis* (Klotzsch) L. E. Bishop, from northern South America, differs in having numerous setae along the abaxial costae and in the sori. Colombian specimens annotated by Bishop as *C. killipii* (ined.) are also very similar to *C. tristis* and may prove to be conspecific (*Killip et al. 38061*, US; *Killip & Smith 15910*, NY, US).

Paratype. COSTA RICA. **Heredia:** above Laguna del Barva and summit of Volcán Barva, $10^\circ 08' \text{N}$, $84^\circ 06.5' \text{W}$, 2,840–2,900 m, *Grayum & Quesada 7421* (MO).

Ceradenia bishopii (Stolze) A. R. Smith, comb. nov. Basionym: *Grammitis bishopii* Stolze, Fieldiana, Bot., n.s. 32: 86. 1993. TYPE: Peru. Pasco: Prov. Oxapampa, border Prov. Oxapampa and Pasco, *van der Werff et al.* 8569 (holotype, UC).

This was recently described from several collections from Peru (Tryon & Stolze, 1993) and is now known from Bolivia: Cocopunco, 10,000 ft., *Tate* 349 (NY).

Ceradenia congesta (Copeland) L. E. Bishop ex A. R. Smith, comb. nov. Basionym: *Ctenopteris congesta* Copeland, Philipp. J. Sci. 84: 397. 1956. *Grammitis congesta* (Copeland) Lellinger, Amer. Fern J. 74: 58. 1984. TYPE: Peru. Loma Grande, La Convención, *Bües* 2172 (holotype, US).

Ceradenia congesta is known only from the Peruvian type and is most closely related to *C. intricata* from Colombia and Ecuador.

Ceradenia intricata (C. V. Morton) L. E. Bishop ex A. R. Smith, comb. nov. Basionym: *Grammitis intricata* C. V. Morton, Contr. U.S. Natl. Herb. 38: 101. 1967. TYPE: Ecuador. Pichincha: Guamaní Pass, E of Pifo, *Ewan* 16436 (holotype, US).

This was known to Morton (1967) only from the Ecuadorian type, but has since been collected in Colombia. Nariño: Cumbal, vecindad de la Laguna La Bolsa, 3,900 m, *Leist & Möhle* 2185 (COL).

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